TwinMOS *Laputa* MiniPCI (B100)

11b Mini-PCI
Wireless LAN Adapter

User's Manual

TwinMOS®

Contents

PACKAGE CONTENTS

Unpack your **Laputa MiniPCI** kit and verify that all items are present.

- **Laputa MiniPCI** Wireless LAN Adapter
- Coaxial Cable of Antenna (Option)
- External Antenna (Option)
- User's Manual (on CD)
- Driver (on CD)

If any of the items described appear to be damaged or missing, please contact your reseller.

INTRODUCTION

The *Laputa MiniPCI* adapter is a wireless network client that complies with the IEEE 802.11b standard on wireless LANs. The IEEE 802.11b standards compliance means this adapter gives you the flexibility to connect it to any 802.11b network. The IEEE802.11b Ethernet standard allows you to connect computers and devices at speeds up to 11Mbps, dependent upon the distance between wireless adapters, the configuration of your working environment, or the capabilities or limitations of your computer systems.

This *Laputa MiniPCI* Adapter is

- Wi-Fi certified by the WECA. This means that your *Laputa MiniPCI* adapter is compatible with other supplier's IEEE 802.11b compliant WLAN products.
- Fully compatible with any other WLAN system base on Direct Sequence Spread Spectrum (DSSS) radio technology.
- Compatible with the mini-PCI revision 1.0 specification (Oct. 25, 1999)

This *Laputa MiniPCI* Adapter supports following WLAN features

- Automatic transmit data rate select mechanism in the transmit range of 1, 2, 5.5 and 11 Mbps.
- Center frequency channel selection (2.4 GHz)
- Roaming over multiple channels.
- Power Management.
- 128-bit Wired Equivalent Privacy (WEP) data encryption.

This *Laputa MiniPCI* comes with software drivers for the most popular Microsoft Windows operating systems and can be integrated into a larger network, running Windows XP, Windows 2000, Windows ME, or Windows 98 in either Peer-to-Peer mode or Infrastructure mode. This manual provides a quick introduction to wireless technology and its application as it relates to networking. Take a moment to read through this manual and familiarize you with wireless technology. You should also give yourself some time to become familiar with your new wireless network.

WIRELESS NETWORK OVERVIEW

A wireless local area network (LAN) is a flexible data communications system implemented as an extension to, or as an alternative for, a wired LAN. Using radio frequency (RF) technology, wireless LANs transmit and receive data over the air, minimizing the need for wired connections. Thus, wireless LANs combine data connectivity with user mobility.

A local area network that transmit and receive over the air typically in an unlicensed frequency such as the 2.4GHz band. A wireless LAN does not require lining up devices for line of sight transmission like IrDA. Wireless access points (base stations) are connected to an Ethernet hub or server and transmit a radio frequency over an area of several hundred to a thousand feet which can penetrate walls and other nonmetal barriers. Roaming users can be handed off from one access point to another like a cellular phone system. Laptops use wireless modems that plug into an existing Ethernet port or that are self contained on PC cards, while stand-alone desktops and servers use plug-in cards (ISA, PCI, etc.).

Wireless LANs offer the following productivity, convenience, and cost advantages over traditional wired networks

Mobility - WLAN provide LAN users to access data in any location within the operating range of the WLAN. Ad-hoc management decisions based on real-time information can significantly improve worker efficiency.

Installation Speed and Simplicity - Installing a wireless LAN system can be fast and easy and can eliminate the need to pull cable through walls and ceilings.

Installation Flexibility - Wireless technology allows the network to go where wire cannot go.

Reduced Cost-of-Ownership - While the initial investment required for wireless LAN hardware can be higher than the cost of wired LAN hardware, overall installation expenses and life-cycle costs can be significantly lower. Long-term cost benefits are greatest in dynamic environments requiring frequent moves and changes.

Scalability - Wireless LAN systems can be configured in a variety of topologies to meet the needs of specific applications and installations. Configurations are easily changed and range from peer-to-peer networks suitable for a small number of users to full infrastructure networks of thousands of users that enable roaming over a broad area.

Installation Considerations

Designed to go up to 300 feet (100 meters) indoors and up to 900 feet (273 meters) outdoors, **Laputa MiniPCI** lets you access your network from virtually anywhere you want. Keep in mind, however, that the number and thickness of walls, ceilings or other objects that the wireless signals must pass thru may limit range. Typical ranges vary depending on the types of materials and background RF noise in your home or business. The key to maximizing range is to follow these basic principles:

Keep the number of walls and ceilings between the access point and your receiving device to a minimum - Each wall or ceiling can reduce your TwinMOS **Laputa** Wireless product's range from 3-90 feet (1-30 meters.) For some businesses or for a large residential home deployment, it may be more beneficial to have more than one access point with overlapping coverage.

1. *Be aware of the direct line between Access Points, Residential Gateways, and Computers - A wall that is 1.5 feet thick (.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Try to make sure that the Access Points and Adapters are positioned so that the signal will travel straight through a wall or ceiling for better reception.*

2. *Building Materials make a difference - A solid metal door or aluminum studs may have a negative effect on range. Try to position Access Points, Residential Gateways, and Computers so that the signal passes through drywall or open doorways and not other materials.*

3. *Make sure that the antenna is positioned for best reception by using the software signal strength tools included with your product.*

4. *Keep your product away (at least 3-6 feet or 1-2 meters) from electrical devices that generate RF noise, like microwaves, monitors, electric motors, etc.*

For the average residence, range should not be a problem. If you experience low or no signal strength in areas of your home that you wish to access, consider positioning the Access Point in a location directly between the Residential Gateways and/or Computers that will be connected. Additional Access Points can be connected to provide better coverage in rooms where the signal does not appear as strong as desired.

Using radio frequency (RF) technology, WLANs transmit and receive data over the air, minimizing the need for wired connections. Thus, WLANs combine data connectivity with user mobility, and, through simplified configuration, enable movable LANs.

Laputa MiniPCI WIRELESS NETWORK SCENARIOS

The **Laputa MiniPCI** enables you to:

● Connect your computer to a Peer-to-Peer workgroup of wireless computing devices (see Figure 1-1 on page 7).

● Connect your computer to a Small Office/Home Office (SOHO) network that includes a Residential Gateway (RG) access point (see Figure 1-2 on page 8).

● Connect your computer to a Local Area Network (LAN) Infrastructure that includes Access Points, or other IEEE 802.11 compliant LAN systems (see Figure 1-3 and Figure 1-4).

● Expand the capabilities of your Access Points, to support wireless devices that have been equipped with **Laputa MiniPCI**.

Peer-to-Peer Workgroup

The Peer-to-Peer workgroup configuration enables you to quickly set up a small wireless workgroup, where the workgroup participants can exchange files using features like "Files and Printer Sharing" as supported by Microsoft Networking.
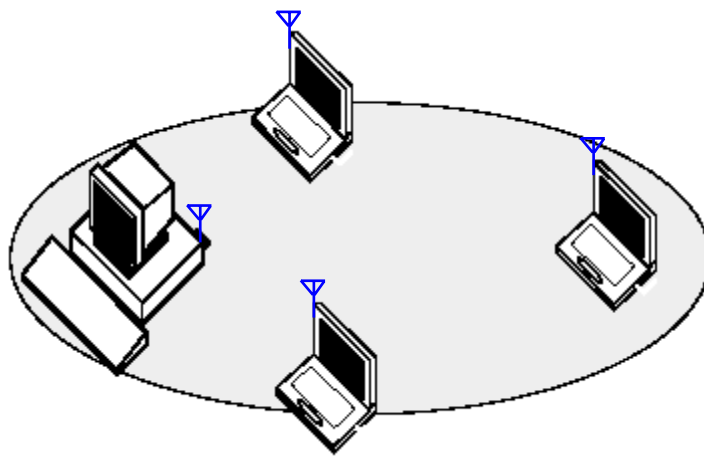

Figure 1-1 Peer-to-Peer Wireless Workgroup

You can use this option to setup a temporary or ad-hoc network in environments where no access points are available (for example in Small Office/Home Office (SOHO) environments). As long as the stations are within range of one another, this is the easiest and least expensive way to set up a wireless network.

Home Networking

With the TwinMOS *Laputa MiniPCl*, wireless access to the Internet or other computers is at your fingertips. All you need to do is connect the wireless computers to an external cable, an xDSL or a ISDN modem and you are ready to
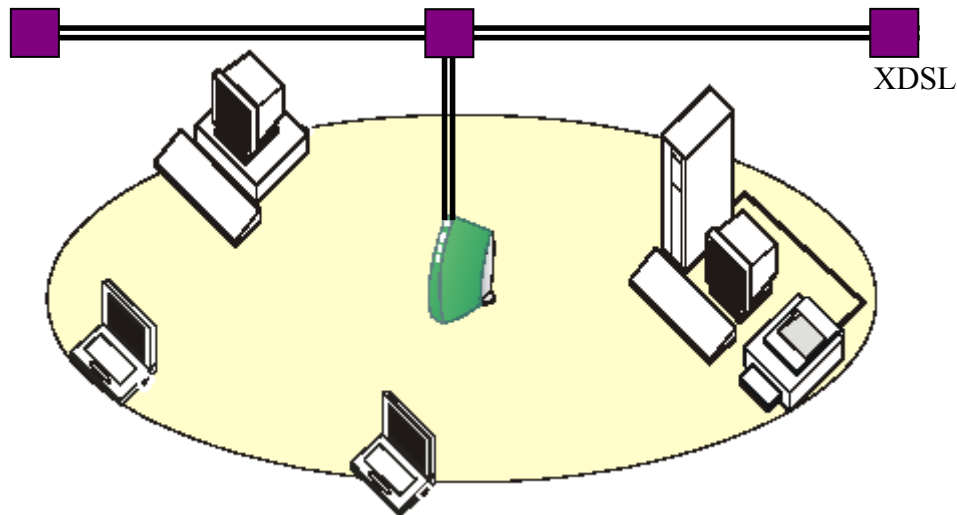
- Share files and printers, and
- Access the Internet

XDSL

Figure 1-2 Connect to a Residential Gateway (RG)

Enterprise Networking

With the 11 Mbps Wireless LAN access point you can connect to a corporate Local Area Network (LAN) infrastructure to have wireless access to all network facilities. LAN Infrastructures may either be:

- Stand-alone wireless LANs (Figure 1-3).
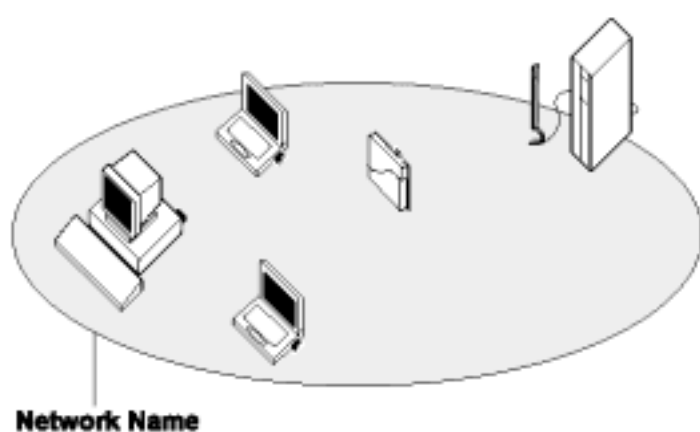- Wireless network infrastructures connected to an existing Ethernet network (Figure 1-4).
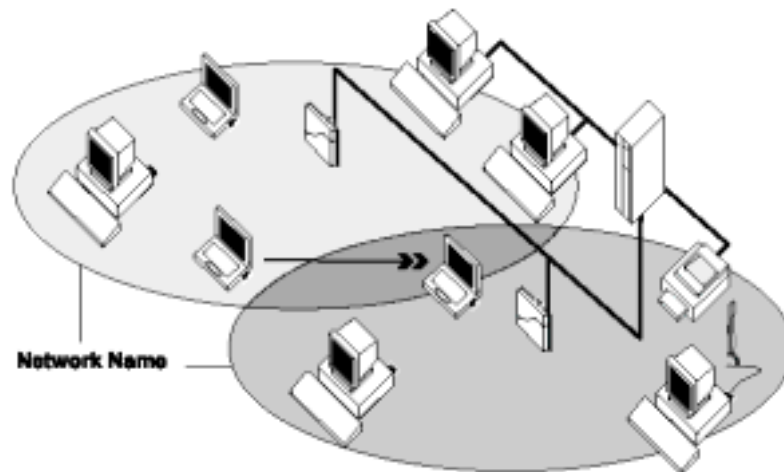

Figure 1-3 Stand Alone Wireless LAN

Figure 1-4 LAN Infrastructure

It's Easy

The **Laputa MiniPCI** functions like any standard wired Ethernet card, but **Laputa MiniPCI** does not need any wires!

Where an Ethernet card requires a cable connection to a hub and/or patch panel, the cable physically ties you down to the location of the wired connection.

Laputa MiniPCI allows you to connect your computer to a Local Area Network (LAN) system from anywhere within the wireless coverage area. Expanding or re-designing your network is easy: Add or relocate access point, power-up your (new) wireless computers, and you're done!

Unlike Ethernet, TwinMOS **Laputa MiniPCI** will enable you to roam throughout the network while remaining connected to the LAN.

Note	*The Laputa MiniPCI wireless adapter is a radio product. Refer to the flyer "Information to the User" for regulatory information that may apply in your country.*

INSTALLATION FOR WINDOWS

The following section will assist you to install **Laputa MiniPCI** WLAN adapter successfully. You will install driver firstly and then plug in the **Laputa MiniPCI** WLAN adapter, and finally set the network properties to accommodate resource sharing and select the type of wireless network that you want to install.

In order to establish your wireless network connection, make sure some steps below will be performed.

- Install the Access Point (AP) at first if you use Infrastructure network mode.
- Install the driver using the Installation CD.
- Plug in the **Laputa MiniPCI** wireless LAN adapter.
- Install the network protocol(s) required to communicate on your network. Most likely you will need the TCP/IP protocol.

The PRISM WLAN Configuration Utility is installed simultaneously with the driver by executing the PRISM for Windows (2-0-9).exe file. Note also that some versions of Microsoft Windows operating systems require administrator to install software. If this is the case for your operating system, be sure that you have such privileges before executing the PRISM for Windows (2-0-9).exe file. To upgrade an existing driver, it is not necessary to remove your PRISM driver from your computer. Simply run the PRISM for Windows (2-0-9).exe file to replace the existing driver with the latest version. After the new driver is installed, maybe you must restart the operating system (depend on the Windows' OS).

Please follow the following steps one by one in order to install the **Laputa MiniPCI** adapter successfully.
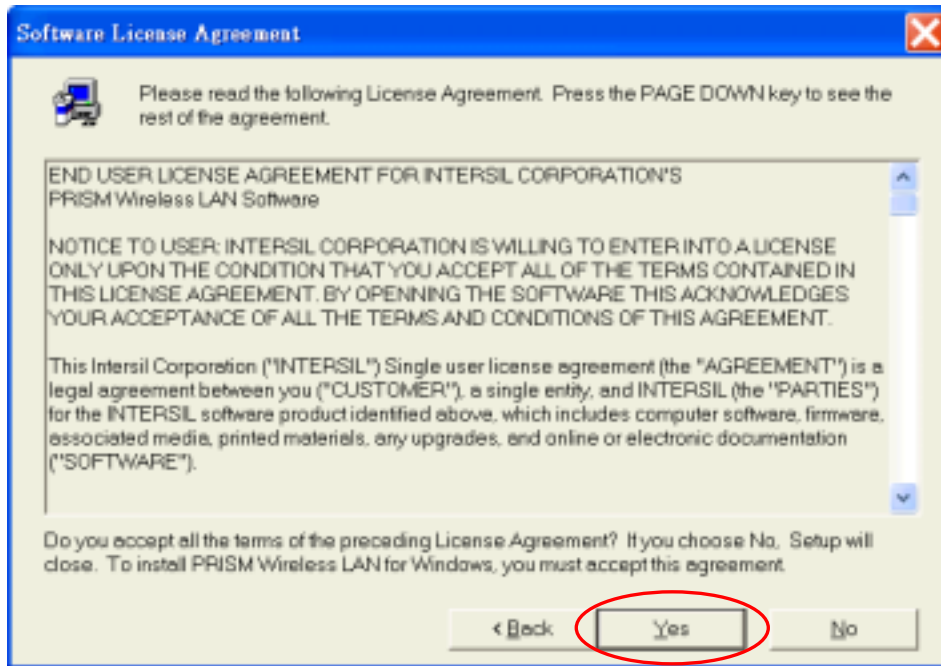
For Windows XP

Insert the given Installation CD in the CD-ROM.

1. Select CD-ROM drives to locate driver files.

2. Run the program "PRISM for Windows(2-0-9).exe" file to set up configuration utility and driver.
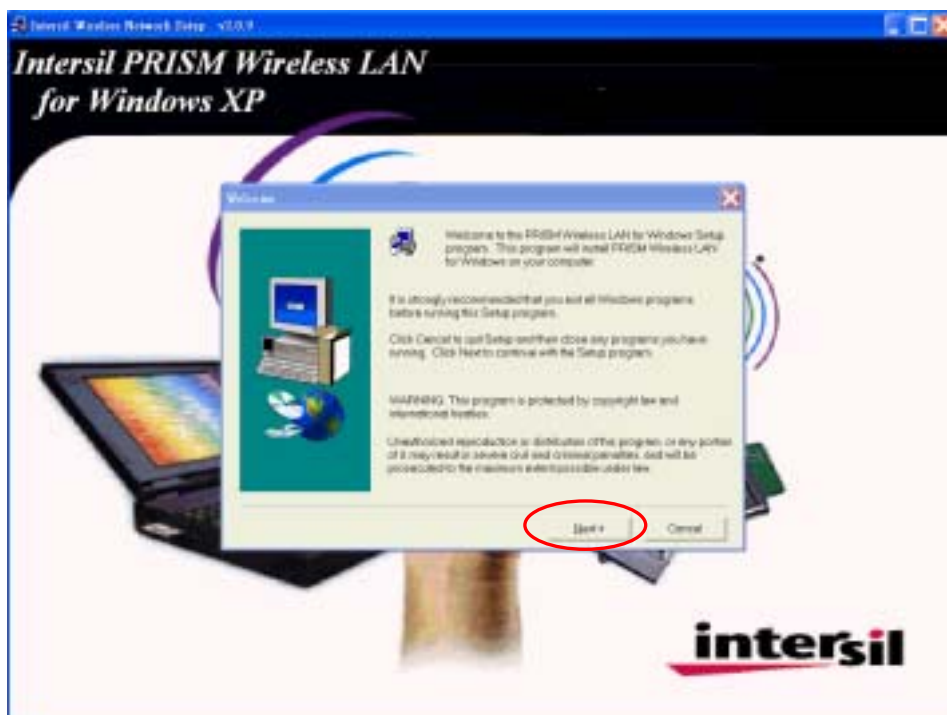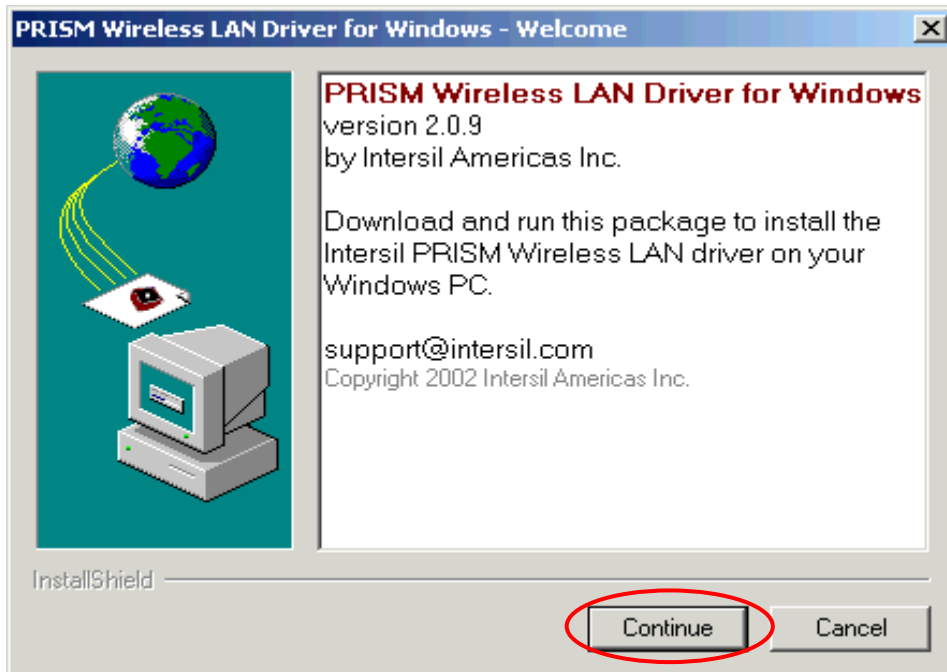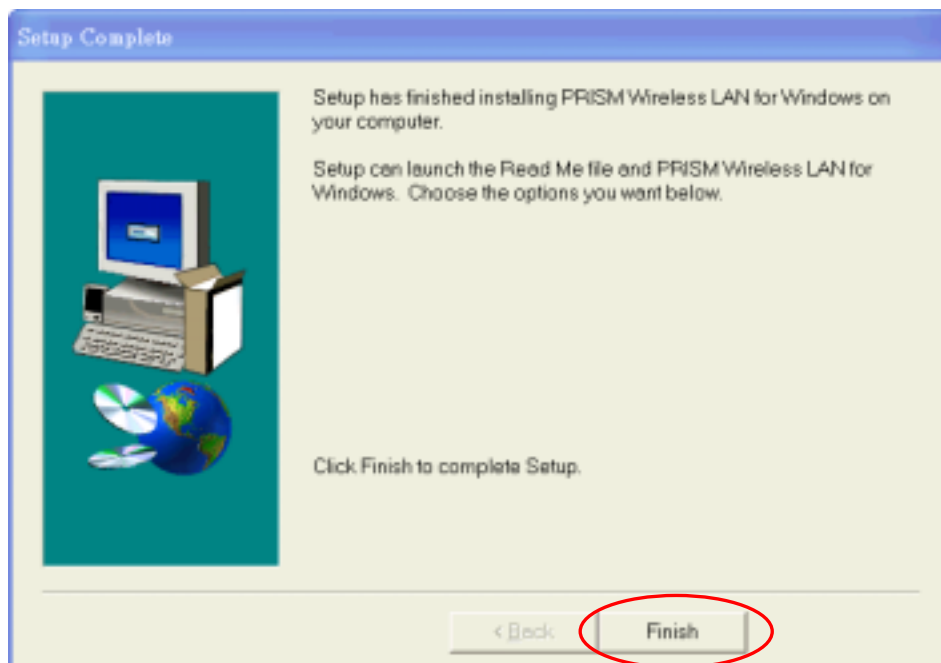

Follow the instruction and click Continue then Next.

3.   Accept the license agreement.

4.   Takes a few seconds for copying the utility files and driver to your computer.
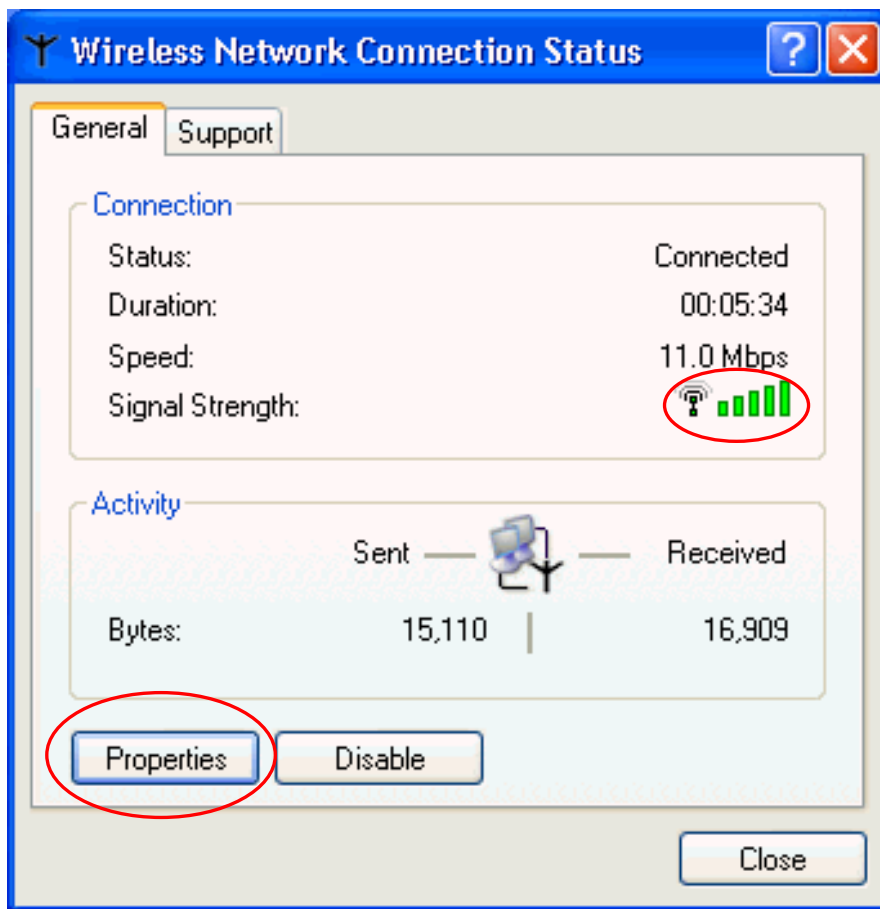

5.   Finished.

6.   Connecting to the wireless network

   To connect to your wireless network, please do the following:

      Double-click on the icon in the task bar. The window on the next page
   will appear showing the current status of your connected network.

      The "Connect to Wireless Network" window will contain a list of all the
      available Wireless Networks. Select the proper network for your needs. In
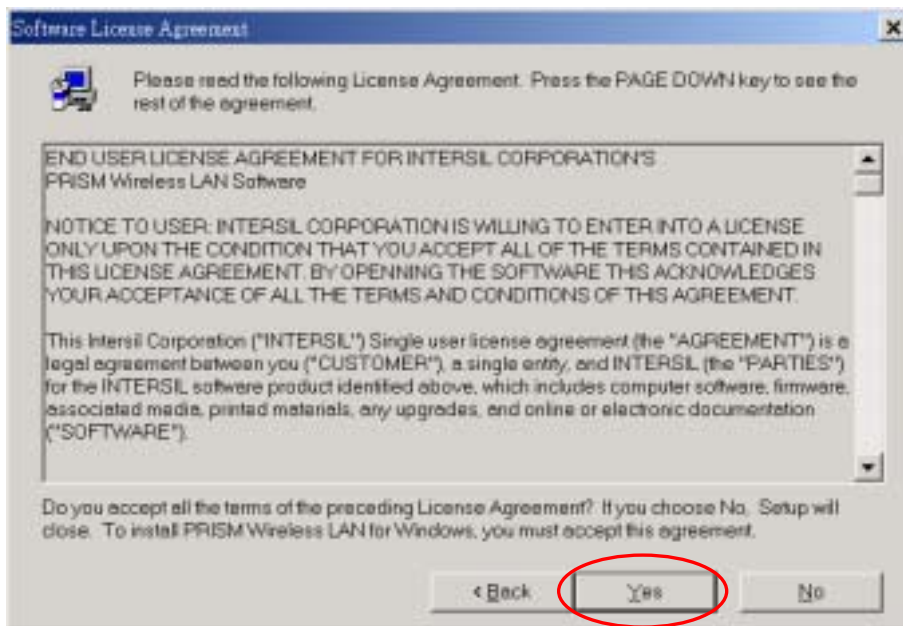   this example, "shortESS" network was selected as shown.
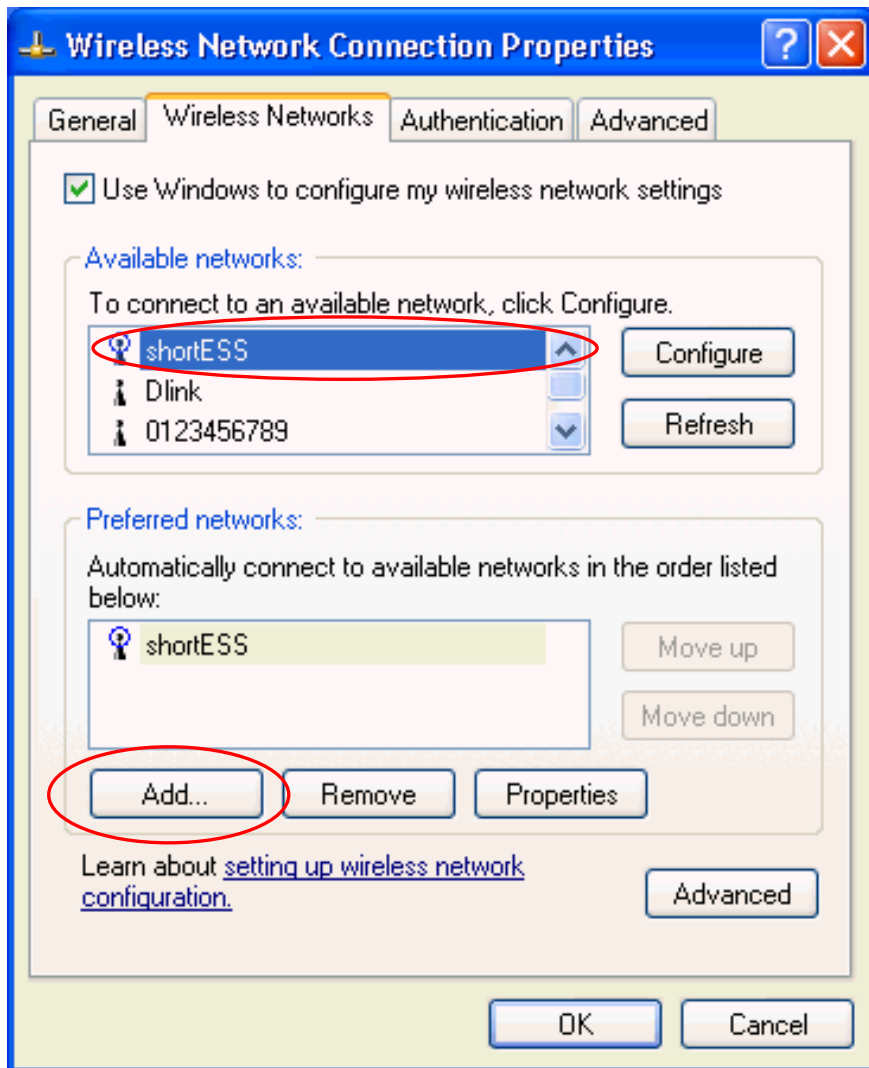
For Windows 2000

Insert the given Installation CD in the CD-ROM.

1. Select CD-ROM drives to locate driver files.

2. Run the program PRISM for Windows(2-0-9).exe file to set up configuration utility and driver.
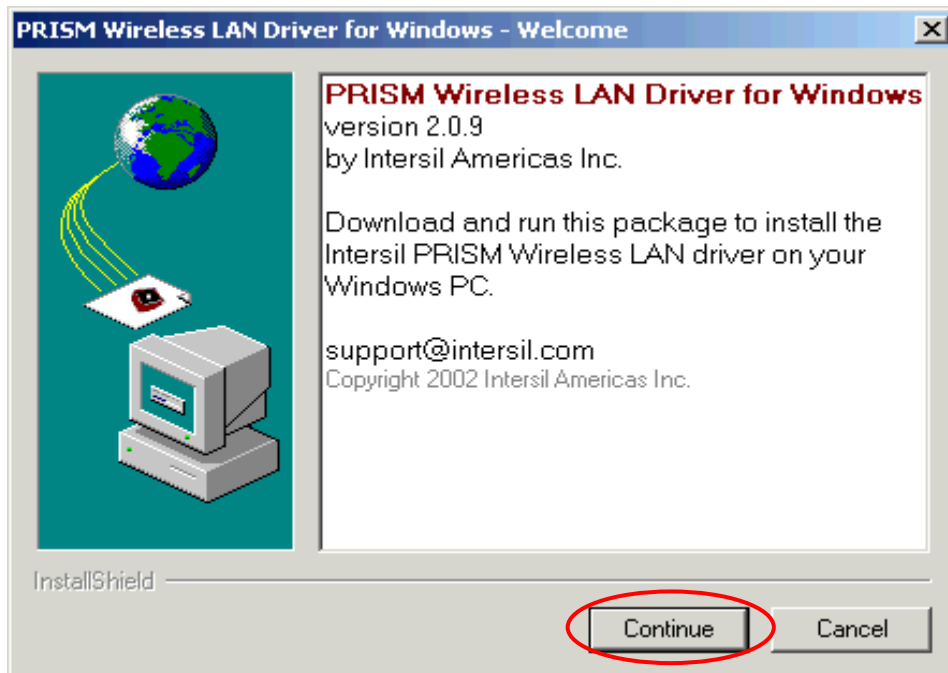
Follow the instruction and click Continue then Next.

3.   Accept the license agreement.

4.   Takes a few seconds for copying the utility files and driver to your computer.

5.   Finished.

For Windows 98/98SE/ME

Insert the given Installation CD in the CD-ROM.

1. Select CD-ROM drives to locate driver files.

2. Run the program PRISM for Windows(2-0-9).exe file to set up configuration utility and driver.

Follow the instruction and click Continue then Next.

3.   Accept the license agreement.

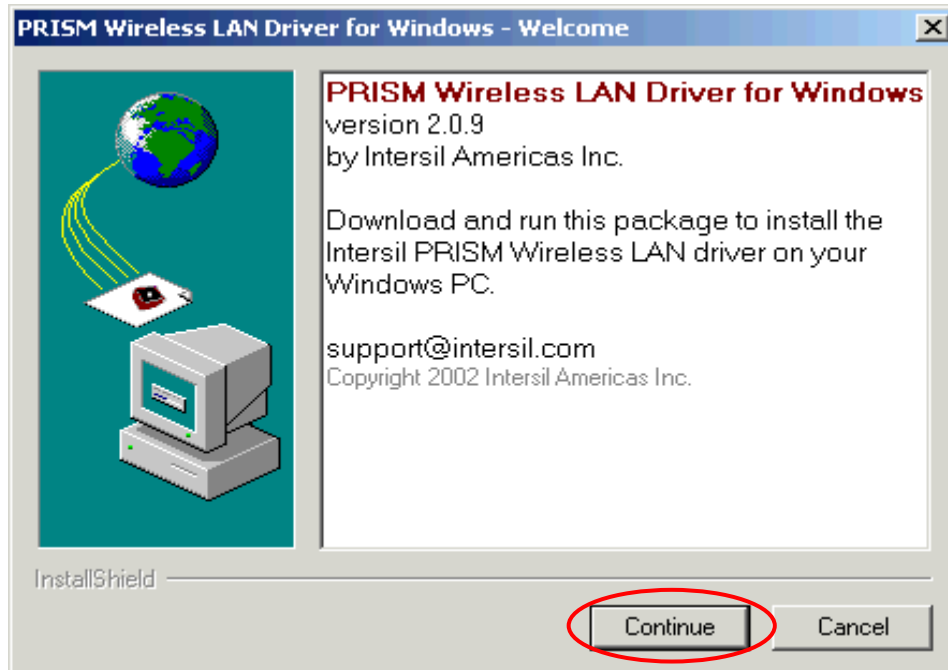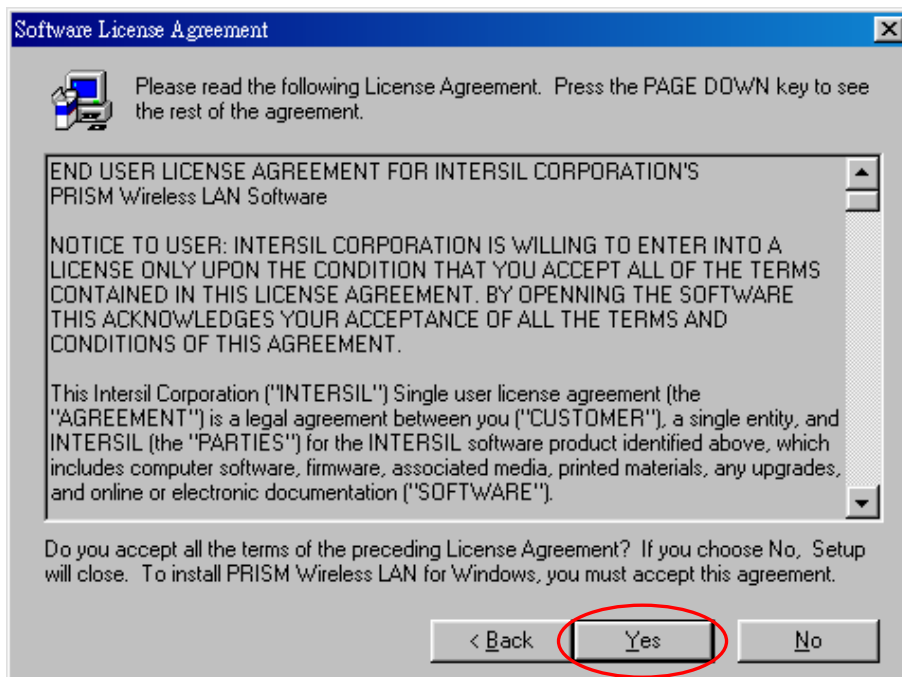4.   Takes a few seconds for copying the utility files and driver to your computer.
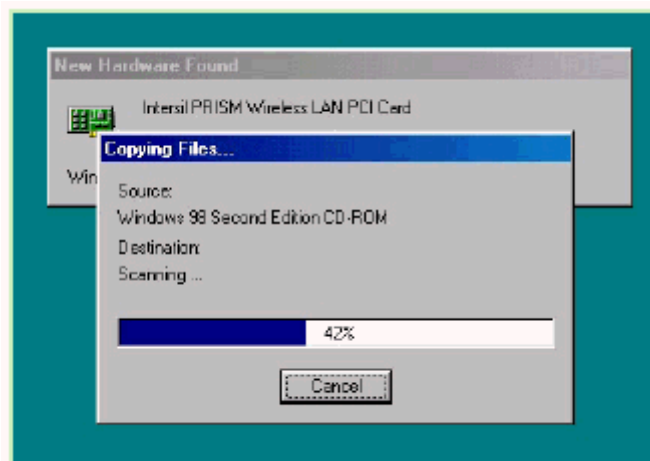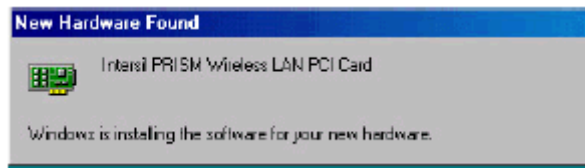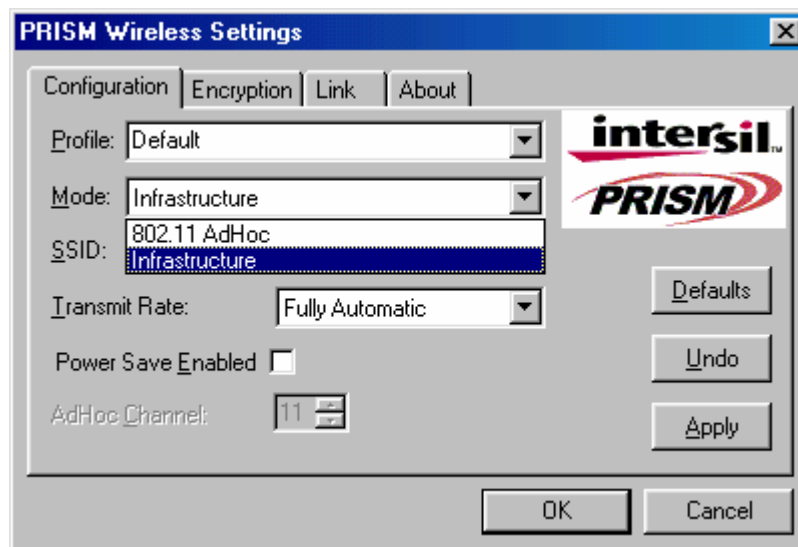

5.   Finished.

6. Restart the computer.

7. Plug in the **Laputa MiniPCI** card into the computer, the system will detect new hardware and auto install the driver.


8. Once installation is complete, the utility will be pops up.

CONFIGURATION UTILITY

TwinMOS **Laputa MiniPCl** uses the Configuration Utility as the management software. The utility provides the user an easy interface to change any settings related to the wireless adapter. When the computer is started, the Configuration Utility starts automatically and the system tray icon is loaded in the toolbar (see illustration below.) Clicking on the utility icon will start the Configuration Utility.
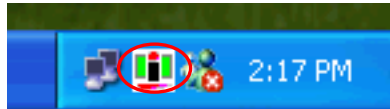
If the icon is in red, it means that the **Laputa MiniPCl** wireless adapter configuration is invalid or incomplete. A "red" icon may indicate that the adapter is set to an incorrect channel or the communication mode is set incorrectly. Verify the settings for the **Laputa MiniPCl** and make sure that the computer is within wireless range.

Double-click on the icon shown above. The screen below will be displayed.
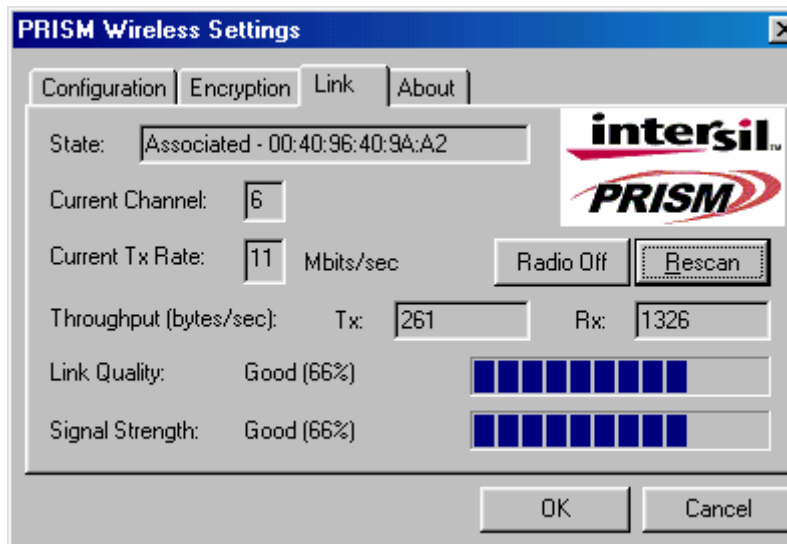
Configuration Tab

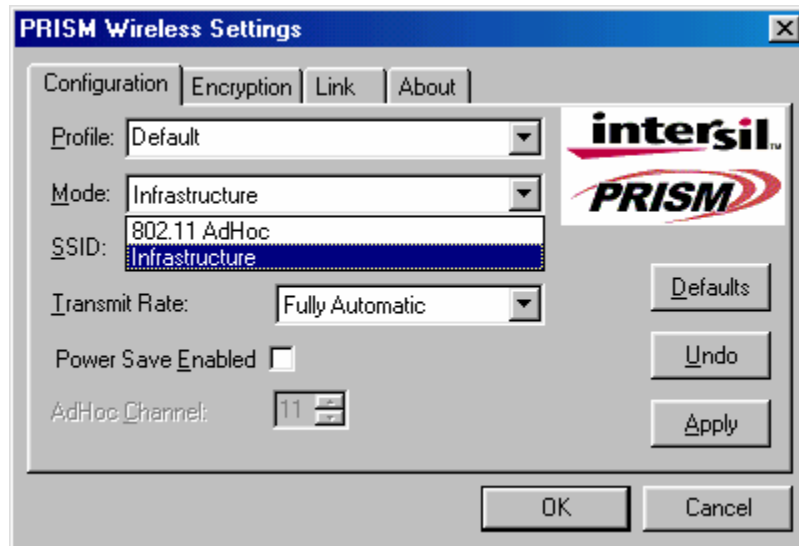Select the Configuration Tab to access the Configuration menu, as shown below. You can make changes to any of the fields shown below, without the need to restart your computer.

Profile

A profile is a named set of operating parameters for your *Laputa MiniPCl* WLAN adapter. The Profile field lets you set values for all parameters by selecting a previously defined profile. Click the down arrow at the right of the Profile field to display the available profiles for your *Laputa MiniPCl* WLAN adapter.

Mode

The *Laputa MiniPCl* WLAN adapter can operate in one of two modes, which are specified in the Mode field of the Configuration menu. Clicking the down arrow at the right of the Mode field displays the available modes.

- *802.11b Ad Hoc* - This is the 802.11b peer-to-peer mode of operation. In "Ad Hoc" mode, only one wireless "cell" is supported for each different SSID. All communication is done from client to client without the use of an Access Point. "802.11b Ad Hoc" networking uses the same SSID for the wireless adapters in establishing the network connection. When "Ad Hoc" mode is selected, the utility will provide a selection for setting the channel.

- *Infrastructure* - This mode of operation requires the presence of an 802.11b Access Point. All communication is done through the Access Point, which relays packets to other wireless clients as well as to nodes on a wired Ethernet network.

SSID

The SSID is the Service Set IDentifier used by Access Points and stations to identify a wireless LAN. The SSID is essentially a name that identifies your wireless network. All Access Points and all devices attempting to connect to a specific Wireless network must use the same SSID.

Transmit Rate

The Transmit Rate field specifies the rate at which the radio in your **Laputa MiniPCI** WLAN adapter transmits and receives data. You can set this to the following fixed rates: 1 Mbps; 2Mbps; 5.5 Mbps or 11 Mbps.

Power Save Mode

Power Saving mode allows your computer to use reduced power during idle time by going into "sleep" mode, saving energy costs.

Ad Hoc Channel

When communicating in AdHoc or Pseudo AdHoc mode, you must specify a channel on which communications will take place. This field is grayed in infrastructure mode because the Access Point automatically selects the channel.

Encryption Tab

The Encryption menu lets you enable encryption and set the encryption keys. To see the available encryption methods, click the down arrow at the right of the Encryption (WEP) field.
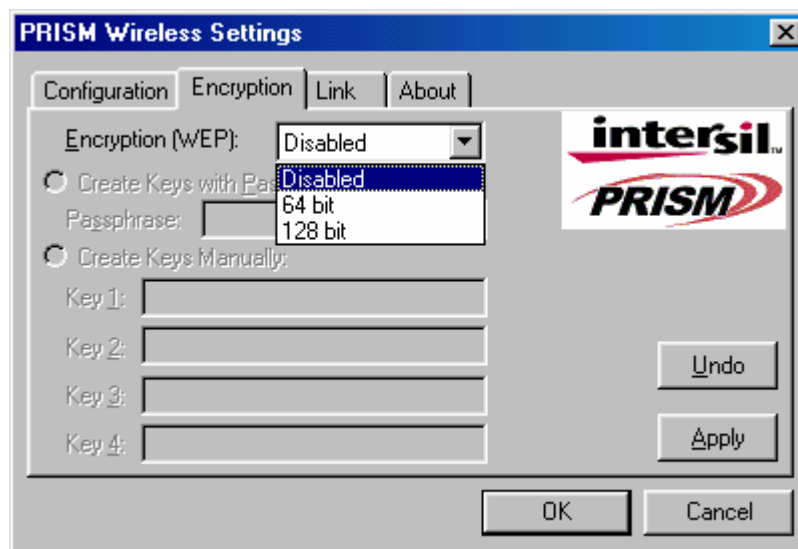
There are two encryption methods available. The IEEE 802.11 specification defines Wired Equivalent Privacy (WEP) using a 64-bit key. This capability was extended by the industry to allow a 128-bit key.

Disabling Encryption

To disable encryption, click the down arrow at the right of the Encryption field, select Disabled, and click the Apply button.

Disabling Encryption

To enable encryption, click the down arrow at the right of the Encryption field, select either 64 bit or 128 bit, and click the Apply button. After enabling an encryption method, you must then specify encryption keys, as described in the following sections.

If you specify an encryption method, you will only be able to communicate with Access Points and stations that use the same encryption method and keys.

Creating Encryption Keys Using a Pass phrase

To create encryption keys using a pass phrase, click the radio button next to Create Key with pass phrase and type a character string in the pass phrase field. As you type, the Configuration Utility uses an algorithm to generate four keys used for encryption.

When you finish typing your character string and click the Apply button, the Configuration Utility uses asterisks to mask both your pass phrase and the keys it generates.

Using a pass phrase to generate the four keys makes it easy to set the same keys for all members of your wireless LAN. Please make a record of your pass phrase, so that you do not forget it. If you do forget your pass phrase, then disable encryption and create new pass phrases.

Creating Encryption Keys Manually

If you wish, you can create encryption keys manually by selecting the Encryption tab. Click on the button next to Manual Entry.

When you click this button, the cursor appears in the field for Key 1. For 64-bit encryption, you must type *exactly* 10 hexadecimal digits in each of the four key fields; for 128-bit encryption, you must type *exactly* 26 hexadecimal digits. You then click the Apply button to create your encryption keys. After you click the Apply button, the Configuration Utility uses asterisks to mask your keys. Remember to make a note of your hexadecimal string for each key. If you do forget your digits for a key, disable encryption and create a new key.

Link Tab

The Link Info Tab displays the current state of your wireless adapter.
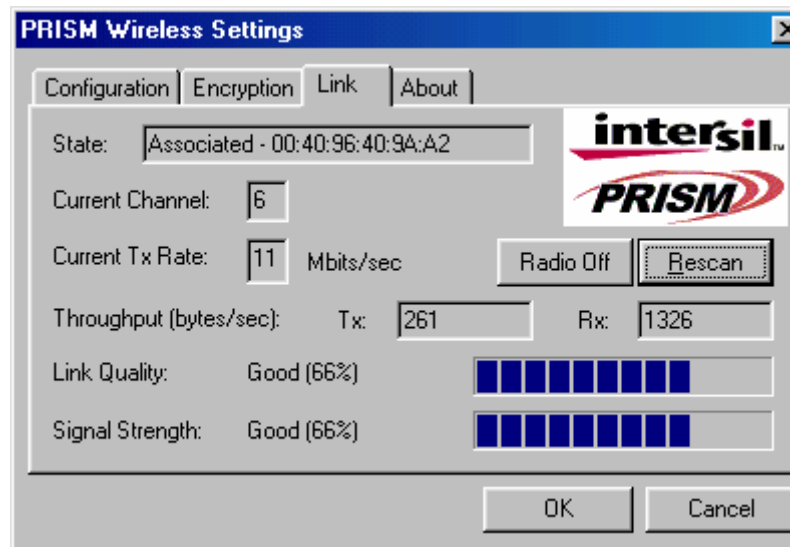
The fields in this menu provide the following information:

State
Shows the association state of your computer with the wireless LAN. When operating in Infrastructure mode, this field shows the MAC address of the Access Point with which you are communicating. When operating in AdHoc mode, this field shows the virtual MAC address used by computers participating in the AdHoc network. In both cases, the MAC address will be shown in hex format (BSSID.) If the word scanning appears in this field, it indicates that networking has not been achieved. The adapter is searching for an available Access Point, within range. (Note: If there is a problem with the driver installation, this field will display an error message.)

Current Channel
Shows the channel on which the connection is made. In Infrastructure mode, this number changes as the radio scans the available channels.

Current TX Rate
Shows the highest transmit rate of the current association.

Throughput
Shows the short term transmit and receive throughput in bytes/second, and is continuously updated.

Link Quality
Is based on the quality of the received signal of the Access Point beacon.

Signal Strength
Is active only when in Infrastructure Mode. The graph displays normalized signal strength averaged over all frames that over 100 bytes long that are received by the Access Point.

About Tab

The About menu provides information on the version of the Network Driver, the Configuration Utility, and the firmware in the PRISM WLAN Interface card. In addition, this menu also provides the MAC address of the PRISM card, as shown in the following illustration.
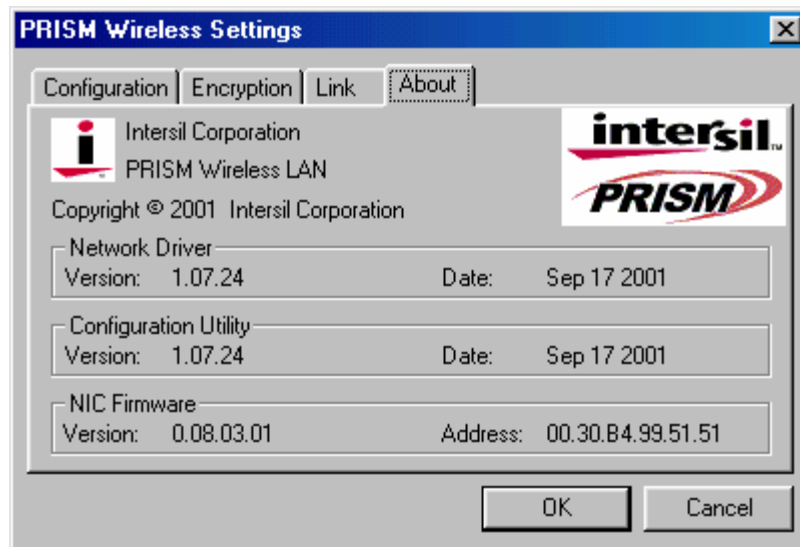
TROUBLESHOOTING

If you encounter some problems while installing the **Laputa MiniPCI** WLAN adapter or you want to confirm whether your adapter is installed properly or not, we have listed the procedure for checking the various components after you have installed the adapter. In first part of Troubleshooting, we have suggested the users to check the various properties of the card to check the proper installation. In second section, we have listed the various problems that you may encounter during the installation and have also listed the possible solution. Check the first part to guess the probable reason of unsuccessful installation.

Please check the followings if you encounter some problem while installing the **Laputa MiniPCI** or your **Laputa MiniPCI** are non-functional.

In Windows 98:

To check that the **Laputa MiniPCI** is installed properly, please do the following:

Go to START>RUN>SETTINGS>CONTROL PANEL>NETWORK. Choose the Configuration Tab. If you find the Wireless LAN Card, it means the card is installed properly. If you see the Yellow Question-mark (?), the resources are conflicting. If your resources are conflicting, please check the following.

   a. Check that you have installed the **Laputa MiniPCI** into the Mini-PCI port and check that you have installed the proper driver.

   b. Check to see if your computer has a free IRQ. If not, make an IRQ free by assigning the same IRQ to some devices, for example COM 1, COM 2 can be assigned the same IRQ values.

In Windows 2000:

To check that the **Laputa MiniPCI** is installed properly, please do the following:

1. Check the Windows 2000 Diagnostics. See if there is any conflict in the Resource allocation or the I/O Address, IRQ allocations. If you find that the IRQ or I/O Addresses are already assigned to some other devices, you must change that value.

2. Go to the Control Panel. Double click on the Network Adapter; you will see **Laputa MiniPCI** Wireless Adapter. Double clicking on that will show you the status of the **Laputa MiniPCI** network adapter. If there are no error signs, the adapter has been installed properly.

In Windows XP:

To check that the **Laputa MiniPCI** is installed properly, please do the following:

1. Go to START>CONTROL PANEL. Double-click on Network Connections. Right-click on LAN. Click Properties.

2. The **Laputa MiniPCI** network adapter will appear, indicating proper installation.

TECHNICAL SPECIFICATIONS

Physical Specification

Dimensions	59.75 x 50.95 x 4.7 mm (wxhxt)
Weight	13 g
Cable Length	Option
Host Interface	MiniPCI Type IIIA
Temperature & Humidity	
Operation	0 to 55　maximum humidity 95%
Transit	-20 to 65　humidity 15% to 95%
Storage	-20 to 65　humidity 10% to 95%

Power Characteristics

Operating Voltage	3.3V±5%
Current Consumption	Nominal 240mA , Max. 300mA

Networking Characteristics

Compatibility	● IEEE 802.11 Standard for WLAN (DSSS) ● Wi-Fi certified by the WECA
Host OS	Windows 98/98SE/ME/2000/XP
Media Access Protocol	CSMA/CA with ACK
Network Protocol	TCP/IP, IPX, NetBEUI

RF Characteristics

| Frequency Range	2.400-2.4835 GHz, Direct Sequence Spread Spectrum (DSSS)
Operating Channels	● 1-11 United States (FCC) ● 1-11 Canada (DOC) ● 1-14 Japan (MKK) ● 1-13 Europe (Except Spain and France) (ETSI)
Modulation Technique	● 11 Mbps: CCK ● 5.5 Mbps: CCK ● 2 Mbps:　DQPSK ● 1 Mbps: DBPSK
Spreading	11-chip Barker Sequence
Transmit Power	14 dBm @ Nominal Temp Range
Receive Sensitivity	Nominal Temp Range: 11 Mbps 10^{-5} BER @ -85 dBm, minimum
Encryption	64-bit WEP , 128-bit WEP
Antenna	Build-in inside host
Operating Range	Open Space: 100 ~ 300m; Indoor: 30m ~ 100m The transmission speed varies in the surrounding environment.
EMC Certification	FCC part 15B, 15C; R&TTE; TELEC/JATE

FCC Caution

1. The device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

    (1)This device may not cause harmful interference.

    (2)This device must accept any interference received, including interference that may cause undesired operation.

2. FCC RF Radiation Exposure Statement: The equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

3. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

4. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

PHYSICAL SIZE
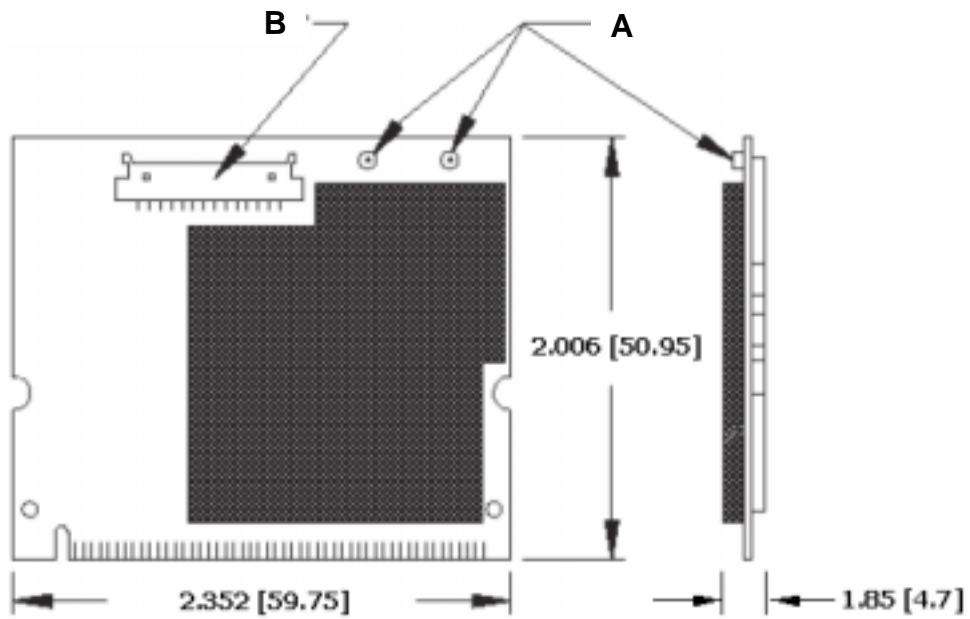
A. Antenna Connector

B. LED Lamp Connector